

JASMINE A. F. KREIG

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EDUCATION

University of Tennessee, Knoxville

August 2016 - July 2021

PhD Energy Sciences and Engineering - 2021

Thesis: Birds and Bioenergy: A modelling framework for managed landscapes at multiple spatial scales

Chair: Dr. Henriette (Yetta) Jager

MS Mathematics - 2019

Thesis: Evaluating scenarios using an agent-based model for pheasant populations and biomass harvest strategies

Chair: Dr. Suzanne Lenhart

University of North Carolina, Chapel Hill

August 2010 - May 2014

BS Environmental Science

BA Mathematics

Minor in Art History

HONORS AND AWARDS

Fellowships

Director's Postdoc Fellow (Los Alamos National Lab), 2023 - Present

Bredesen Center Fellowship (University of Tennessee, Knoxville), 2016 - 2021: \$30,000 per year

Awards

2021

Katherine S. McCarter Graduate Student Policy Award (Ecological Society of America)

2019

PLoS One Future Crops Award: \$800

National Institute for Mathematical and Biological Synthesis Graduate Award: \$2,500

Kuo Fellowship Endowment from UTK Department of Mathematics: \$500

Bredesen Center Honors Day Service Award: \$300

Graduate Student Senate Travel Award (University of Tennessee, Knoxville): \$850

2018

Institute of Math and its Applications NSF Scholarship (University of Minnesota): \$2,500

Graduate Student Senate Travel award (University of Tennessee, Knoxville): \$400

Honors

Gamma Beta Phi National Honor Society

Dean's List (UNC Chapel Hill)

SKILLS

Computer Languages R, Python, MATLAB

Software & Tools ArcGIS/QGIS, LaTeX, SWAT/ArcSWAT, NetLogo, Monolix

Other Proficient Spanish, Microsoft Office

RESEARCH EXPERIENCE

Los Alamos National Laboratory (LANL)

October 2022 - Present

Director's Postdoctoral Fellow

- Developing an agent-based model to investigate affinity maturation with respect to SARS-CoV-2
- Using ordinary differential equation (ODE) models to explore T cell differentiation in patients with HIV
- Modelling within host viral dynamics

Bredesen Center for Interdisciplinary Research at ORNL

August 2016 - July 2021

Graduate Research Fellow

- Created an enhanced species distribution model (BioEST-Suite) tailored for bioenergy research that also utilized 3 different modelling methods (Random forest, Stochastic gradient boosting, Neural network)
- Utilized BioEST-Suite in evaluating species richness under a potential future landscape for cellulosic bioenergy production
- Determined that it is possible to increase species richness 3-8% by converting unprofitable areas in Iowa (3%) to grassland
- Examined ecosystem services provided by 25 avian species and explored the relationship between ecosystem service provided and species distribution
- Built an agent-based model (ABM) in NetLogo that simulated 4 agents (pheasants, hunters, tractors, and vegetation) dynamically interacting at the field scale
- Investigated via ABM various spatiotemporal management strategies of tractors and hunters, and resultant impacts on pheasant population dynamics, biomass yield, and pheasant yield across 4 different field compositions
- Worked with a larger Antares project team that includes Argonne National Lab, Pennsylvania State University, Iowa State University, USDA, Idaho National Lab, and Pheasants Forever

Oak Ridge National Laboratory (ORNL)

October 2014 - August 2016

Post Bachelor Research Associate

- Examined the relationship between bioenergy crop management practices and water quality and quantity using SWAT (Soil and Water Assessment Tool) modelling
- Generated Python scripts for manipulating 100,000+ files of data
- Completed optimizations in R to determine optimal management practice allocation to maximize crop yield and minimize water quality impacts
- Collaborated on a biodiversity assessment for the entire US to determine the effects of bioenergy production on species habitat
- Implemented a downscaling algorithm of land data for the biodiversity assessment using R
- Conducted data analysis and visualization in Python and R

UNC Institute for the Environment

May 2014 - October 2014

Research Assistant in Dr. Larry Band's Lab

- Applied hydrological modelling programs, ArcSWAT and HEC-RAS, to examine the effects of land use change on nutrient cycling in watersheds
- Performed statistical analysis on model generated data using Excel, MATLAB, and R
- Organized and directed research team collecting primary data
- Engaged in hands-on data collection in the field

NC Department of Environment and Natural Resources (DENR) Capstone Project 2014

- Designed an experiment to evaluate the effectiveness of NC DENR's stream restoration practices
- Collected data in the field and evaluated water samples in the lab
- Analyzed data, synthesized information, co-authored the final report, and presented findings at the Capstone Research Symposium

UNC School for Public Policy

August 2012 - May 2013

Research Assistant for "Research on Research Triangle"

- Contributed to and managed a database of start-ups created by entrepreneurs from the Research Triangle Park (RTP)
- Interviewed Dr. Fred P. Brooks, manager of the development of IBM's System/360 family of computers and the OS/360 software support package, author of "The Mythical Man-Month", founder of the Computer Science Department at UNC-CH, and instrumental architect in the creation of RTP
- Investigated the influence of IBM on the growth of RTP, as well as the employment policies of IBM and how those have led to a culture of entrepreneurial tech start-ups

TEACHING EXPERIENCE

Tutor Connections

May 2018 - May 2022

*Math Tutor***ESE 512 Introduction to Energy Science and Technology II**

Spring 2018

*Teaching Assistant***UNC Math Help Center**

August 2013 - May 2014

*Math Tutor***LEADERSHIP**

Pipeline: Vols for Women in STEM

October 2016 - June 2020

- Chair, October 2017 - June 2020
- Data & Statistics Committee Director, October 2016 - October 2017

University of Tennessee, Knoxville Commission for Women

October 2017 - June 2020

*Commissioner***Graduate Student Senate**

August 2018 - June 2020

Bredesen Center Senator

- Diversity and Equity Committee Member

Bredesen Center Student Advisory Council

January 2019 - June 2020

*Founding Board Member***Advocates for the Oak Ridge Reservation**

January 2016 - Present

*Board Member***Theta Nu Xi Multicultural Sorority, Inc.**

October 2012 - June 2014

*President***Students for Students International**

March 2011 - June 2014

- Director of Operations, May 2013 - June 2014
- Director of Grants, March 2011 - May 2013

PUBLIC SERVICE

Albuquerque Mutual Aid

October 2020 - Present

- Assemble packages of requested food for distribution

- Deliver food to communities of folks experiencing homelessness

National Science Bowl Competition

February 2022 - March 2023

- Question Writer

Tennessee Science Bowl Competition

February 2015 - July 2020

- Science Judge
- Question Writer
- Question Reviewer

Buckley Public Service Scholar

Chapel Hill, NC

PEER-REVIEWED PUBLICATIONS

Journal Publications

- [1] Jager, H.I., M.R. Hilliard, M. Langholtz, R. Efroymson, C.C. Brandt, S.S. Nair, J.A.F. Kreig (2022) Ecosystem service benefits from perennial biomass production. *Science of the Total Environment* **834**.
- [2] Kreig, J.A.F., E.S. Parish, H. I. Jager (2021) Growing grasses in unprofitable areas of US Midwest croplands could increase species richness. *Biological Conservation* **261 (5)**.
- [3] Kreig, J.A.F., H. Ssegane, I. Chaubey, C. Negri, H. I. Jager (2019) Designing Bioenergy Landscapes to Protect Water Quality. *Biomass and Bioenergy* **128**.
- [4] Kreig, J.A.F., S. Gangrade, D. Rastoogi, R. Daniels (2019) Modernizing Animal Agriculture for a Cleaner and Healthier America: A Policy Memorandum to the Congress of the United States. *Journal of Science Policy and Governance* **14**.
- [5] Jager, H.I., J.A.F. Kreig (2018) Designing Landscapes for Biomass Production and Wildlife. *Global Ecology and Conservation* **16**.

Significant Reports (Peer-Reviewed)

- [1] Kreig, J.A.F., H.I. Jager (2022) Chapter 3 Biodiversity Impacts of Landscape Design. *Enabling Sustainable Landscape Design for Continual Improvement of Operating Bioenergy Supply Systems* doi:10.2172/1846013
- [2] Jager, H.I., M. Wu, M. Ha, L.M. Baskaran, J.A.F. Kreig (2017) Chapter 5 Water Quality Responses to Simulated Management Practices on Agricultural Lands Producing Biomass Feedstocks in Two Tributary Basins of the Mississippi River. *2016 Billion-Ton Report (BT16), Volume 2: Environmental Sustainability Effects of Select Scenarios from Volume 1*. Department of Energy and Oak Ridge National Laboratory.
- [3] Jager, H.I., G. Wang, J.A.F. Kreig, N.J. Sutton, I.K. Busch (2017) Chapter 10 Simulated Response of Avian Biodiversity to Biomass Production. *2016 Billion-Ton Report (BT16), Volume 2: Environmental Sustainability Effects of Select Scenarios from Volume 1*. Department of Energy and Oak Ridge National Laboratory.

Invited Talks and Seminars

- [1] Kreig, J.A.F., R. Ke, R.M. Ribiero, A. Perelson (2023) Using an agent-based model to explore affinity maturation of B cells: a SARS-CoV-2 case study. *Society of Mathematical Biology Annual Conference 2023*, Columbus, Ohio, USA, July 16-21, 2023.
- [2] Kreig, J.A.F. (2019) Two pheasants walk into a field: my graduate journey thus far. *ESE 599 Seminar*, September 26, 2019.
- [3] Kreig, J.A.F., S. Lenhart, H.I. Jager (2019) Evaluating scenarios using an agent-based model for pheasant populations and biomass harvest strategies. *Society of Mathematical Biology Annual Conference 2019*, Montreal, Canada, July 21-26, 2019.

Posters and Presentations

- [1] Kreig, J.A.F., H.I. Jager (2020) Predicting species responses to bioenergy in Iowa landscapes. *Ecological Society of America Annual Meeting 2020*, Virtual Meeting due to COVID-19 Pandemic, August 3-6, 2020.
- [2] Kreig, J.A.F., H.I. Jager, S. Lenhart (2019) Can Biomass Production in Multifunctional Agricultural Landscapes Generate wildlife Value? *Ecological Society of America Annual Meeting 2019*, Louisville, KY, August 11-16, 2019.
- [3] Jiang, N., J.A.F. Kreig, B.D. Kristy, R.B. Laurel, R.M. Wittman, A.A. Eskew, K.L. Cross, N.D. Phillip, J.M. Velez, R.L. Zaretzki, M.L. Simpson, L.L. Riedinger (2019) It's time for scientists to reach out. *American Society for Biochemistry and Molecular Biology Annual Conference 2019*, Orlando, FL, April 6-9, 2019.
- [4] Kreig, J.A.F., H.I. Jager, G. Wang (2018) A modeling framework for predicting species richness as a measure of biodiversity in changing bioenergy-landscapes. *Ecological Society of America Annual Meeting 2018*, New Orleans, LA, August 5-10, 2018.
- [5] Wang, G., H.I. Jager, J.A. Kreig, N.J. Sutton, I.K. Busch (2017) Simulated Response of Avian Biodiversity to Biomass Production in the Conterminous United States. *Ecological Society of America Annual Meeting 2017*, Portland, OR, August 6-11, 2017.
- [6] Baskaran, L.M., H.I. Jager, J.A.F. Kreig, M.R. Hilliard, G. Wang (2016) Exploring the Potential for Sustainable Future Bioenergy Production in the Arkansas-White-Red River Basin. *American Geophysical Union Fall Meeting 2016*, San Francisco, CA, December 2016.
- [7] Kreig, J.A.F., H.I. Jager, L.M. Baskaran (2016) Spatial allocation of conservation practices to maximize bioenergy production and water quality at a regional scale. *The International Society for Ecological Modelling Conference 2016*, Baltimore, MD, May 8-12, 2016.
- [8] Kreig, J.A.F., H.I. Jager, L.M. Baskaran, M.R. Hilliard (2016) Designing bioenergy landscapes to improve water quality through spatial allocation of conservation practices. *International Association of Landscape Ecologists Conference 2016*, Asheville, NC, April 3-7, 2016.
- [9] Jager, H.I., N.J. Sutton, J.A.F. Kreig, L.M. Baskaran, G. Wang (2016) Can future US bioenergy production coexist with avian biodiversity? *International Association of Landscape Ecologists Conference 2016*, Asheville, NC, April 3-7, 2016.
- [10] Baskaran, L.M., H.I. Jager, J.A.F. Kreig, G. Wang, C. Brandt (2016) Identifying opportunities for sustainable bioenergy production in two southern tributary basins of the Mississippi River Basin: focus on water quality, quantity and biodiversity. *Association of American Geographers Annual Meeting 2016*, San Francisco, CA, March 29, 2016.
- [11] Kreig, J.A.F., H.I. Jager, L.M. Baskaran (2015) The Effects of Management Practices on Water Quality in a Bioenergy Landscape. *Oak Ridge National Laboratory Postdoc Research Symposium 2015*, Oak Ridge, TN, July 30, 2015.
- [12] Jager, H.I., L.M. Baskaran, G. Wang, J.A.F. Kreig, N.J. Sutton (2015) Sustainable Bioenergy Production to Enhance Water Quality and Biodiversity. *Biomass 2015*, Washington DC, June 24-25, 2015.

PROFESSIONAL AFFILIATIONS

Society of Mathematical Biology (SMB)

January 2020 - Present

- Member of subgroups: Immunobiology and Infection; Mathematical Epidemiology; Methods for Biological Modeling; Population Dynamics, Ecology, and Evolution

National Postdoc Association

October 2022 - Present

- Member

Ecological Society of America (ESA)

June 2019 - January 2023

- Won the Katherine S. McCarter Graduate Student Policy Award, 2021
- Theoretical Ecology Section Student Liaison (March 2020 - July 2021)

Society for Industrial and Applied Mathematics (SIAM)

August 2016 - July 2021

- Optimization Subgroup Member
- Mathematics of Planet Earth Subgroup Member

Mathematical Association of America (MAA)

August 2016 - July 2021

OTHER WORK EXPERIENCE

Three3 (ThreeCubed)

August 2016 - July 2021

Independent Consultant

- Evidence for Action - Investigator-Initiated Research to Build a Culture of Health project
- Wrote R codes that collected, organized, and cleaned national health data
- Contributed to the preparation of NSF proposal on Resilience in Cities

Tennessee State Energy Policy Council

August 2016 - June 2018

Legislative Subject Expert

- Aided Representative John Ragan (TN-33) in passing legislation to establish the Tennessee State Energy Policy Council
- Acted as liaison between Tennessee Department of Environment and Conservation (TDEC) and Rep Ragan's office

CERTIFICATIONS

PADI Open Water Scuba Diver

Red Cross Water Safety Instructor

CPR/AED Administration